Material examined: Also 2 ♂ ad. 1 ♀ ad. 1 one-year-old ♀, Tres Palos and vicinity (east of Acapulco), Sept. 1965 (all still moulting primaries).

Remarks: This, the palest, is the westernmost race of the species.

(*to be continued*)

The roosting of the Pied Wagtail in Dublin

by JEFFERY BOSWALL

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The roost of *Motacilla alba yarrelli* in the centre of Dublin's fair city is certainly the best-known dormitory in Britain and Ireland of the Pied Wagtail, and is also one of the largest.

Observations were made at the site in O'Connell Street, Dublin, in 1964 as follows: 4th February, 16.45–18.15 hours G.M.T.; 13th March, 19.00–19.30; 14th March, 17.45–18.47 from the top of the Nelson Pillar with C. K. Mylne; 15th March, 17.44–18.55 with Miss Anne Deane; 24th March, 17.40–19.30; and 25th March, 05.25–06.20.

DIRECTION OF ORIGIN OF BIRDS

From the top of the Nelson Pillar, whose parapet was* 160 feet above street level, an attempt was made to determine the direction from which the birds approached the roost during the first part of the assembly period on 14th March. A note was made of the size of flocks and the direction from which all apparently newly-arrived birds came. The word "apparently" is used because it is difficult to be certain that the observer always spots the birds as they actually arrive in the area; he may pick them out only after they have started to circle, which some do. All birds thought to be in this latter category are excluded from the analysis below. It is thought that the figures given reflect a true situation but it is difficult to be certain.

TABLE 1

Directions from which some Pied Wagtails appeared to approach O'Connell Street, Dublin, 18.00–18.35 G.M.T., 14th March, 1964

N.E.	E.	S.E.	S.	S.W.	W.	N.W.	N.
	7	10	13	14	5	10	30
	9	15	4	5	9	9	6
			1		5	13	
			20		1	13	
			3		3		
			1		1		
			9		5		
			3		3		
—	16	25	55	19	32	45	36

As might be expected for a roost near an eastward-facing coast, few flew in from the east, and most appeared to approach from the south and from points west.

*The past tense is used because the pillar was destroyed as a political act at 01·32 hrs. on 9th March, 1966. It is to be hoped that the roosting wagtails were not unduly disturbed.

THE ASSEMBLY

The birds approach the general area of the roost usually flying at roughly 200 feet above street level. Some birds or flocks may fly around, normally for not more than 60 or 90 seconds, before dropping down either into the trees down the centre of the street or roof tops and television aerials. Others will fly in and drop directly to any of the perches described. These observations were made from the top of the Nelson Pillar on 14th March.

On an earlier evening at a time when the birds were still coming in (17.28–17.40 on 4th February), I inspected each of the eleven Plane trees in O'Connell Street, starting with the southernmost, and found the following numbers of birds: 47, 82, 72, 1, 9, 4, 4, 1, 3, 1, and 2. Eventually the birds gathered to roost only in the three southernmost trees. This shows clearly that not all the birds fly directly to their perches.

On 15th March, when both observers stood on the pavement opposite the one tree in which all the birds were to collect for the night, and remained there throughout the assembly time, it was evident that most but not all the birds which alighted in the tree stayed put; a few took off again, presumably returning later. The departures from the tree—as well as the arrivals—per five minutes are shown in Table 2, the total being 69. Most of these merely flew up to join other birds assembling on a nearby rooftop, but one party of ten took off to the south, early, at 18.02, and disappeared behind some buildings several hundred yards away. As one might expect, most of these birds which left the tree did so during the earlier part of the assembly period while it was still reasonably light and before the major influx of birds (see Table 2).

TABLE 2

Numbers of Pied Wagtails entering (and departing from) roosting tree, O'Connell Street, Dublin

G.M.T.	*15th March* 1964				*24th March* 1964			
5 mins. ending	*Ent.*	*Dep.*	*Bal.*	*Acc. total*	*Ent.*	*Ded.*	*Bal.*	*Acc. total*
17.45	2		2	2				
17.50	2		2	4				
17.55	10		10	14	13	1	12	12
18.00	6	10	–4	10	9		9	21
18.05	20	1	19	29	9		9	30
18.10	43	36	7	36	37		37	67
18.15	74	11	63	99	50	2	48	115
18.20	76	2	74	173	106	10	96	211
18.25	184	5	179	352	71	11	60	271
18.30	247	2	245	597	48	12	36	307
18.35	160	1	159	756	58	7	51	358
18.40	44		44	800	39	5	34	392
18.45	6	1	5	805	57	2	55	447
18.50					57		57	504
18.55					54		54	558
19.00					7		7	565
Totals	874	69	805	805	615	50	565	565

Attempts were made on 15th and 24th March to note down, from street level, the time at which all the birds, as singles or parties, entered the tree.

Table 2 shows the numbers of birds entering and leaving the tree each five minutes, with the balance and accumulated total at the end of each five minutes.

On both evenings there was complete cloud cover but at a good altitude, leaving a fairly bright sky. On 15th March the first bird alighted at 17.45 (sunset being at 18.06) and the last bird 62 minutes later at 18.47. As the table shows, the rate of arrival rose fairly steadily during the first 45 minutes, came to a peak during the next 5 minutes and then dropped sharply. The arrivals pattern on 24th March was much more irregular and on that date the birds took 68 minutes to arrive, from 17.55 to 18.03, the sun setting at 18.10.

That the assembly time of this species can vary with light intensity has been shown by Rappe's studies of an urban roost of some 700 birds on the outskirts of Leopoldsburg in Belgium (Rappe, 1960). A sky covered with grey-black clouds put forward the arrival of the wagtails by about a dozen minutes.

For a number of species, for example the Wren (*Troglodytes troglodytes*) (Armstrong, 1955), it is known that the birds retire later in relation to sunset (or civic twilight) on shorter days in winter, presumably because they need the additional time to get enough food. To my knowledge, no systematic work has been done on *Motacilla alba* to demonstrate this, but Moffat (1931) writing of the Dublin assembly does say "It generally began about 20 (or in the shorter days, 23) minutes after sunset, from which time arrivals continued to take place in quick succession for the next twenty minutes."

TABLE 3

To show numbers of parties by size of Pied Wagtails entering roosting tree, Dublin, 15th March, 1964

No. of birds in party:	1	2–10	11–20	21–30	*Total no. of parties*	*Total no. of birds*	*Average party size*
G.M.T. 10 mins. ending							
17.54	4				4	4	1.0
18.04	9	1			10	16	1.6
18.14	12	15			27	63	2.3
18.24	26	25	2		53	150	2.8
18.34	49	38	8	3	98	431	4.4
18.44	33	28	3		64	204	3.2
18.54	6				6	6	1.0
Totals	139	107	13	3	262	874	3.3
Individual birds	139	452	207	76		874	

On 15th and 24th March respectively my first birds arrived 21 and 15 minutes before sunset. However, first arrivals could easily be misleading, depending as they do on the behaviour of one or a few birds. A comparison of peak arrival times is likely to be more revealing and it is here that systematic observations over a period of weeks are demanded.

It will be noticed in Table 3 that the average size of party varies with the numbers of birds arriving per unit time; or, in other words, when birds are arriving at a greater rate, they arrive in bigger parties. If, as general

observation seems to indicate, the Pied Wagtial is a solitary, or near solitary feeder by day (certainly the White Wagtail (*M. a. alba*) is in winter quarters—see Simmons, 1965) and if, as seems likely, light intensity is the proximate factor causing assembly, then the simplest explanation of varying party size on arrival at the roost site is that the birds meet *en route.* Though not referring specifically to the Dublin roost, Kennedy *et al.* (1954) state "On the flight line to roosts and some distance from their destination birds halt in large numbers". Pre-roost assembly points have been observed for a Hampshire roost by Keith Edwards (pers. comm.), but the small size of the parties arriving in the roost site area at Dublin is hardly consistent with large pre-roost assemblies.

THE NUMBERS

I made counts of the settled birds after dark on the evening of 4th February, when there were 918, and on 13th March, when there were 894. On 15th March an attempt to count the birds as they entered the tree gave a total of 805.

On 24th/25th March the birds were counted three times: entering, settled in the evening, and dispersing in the morning; the totals were 565, 610 and 572 respectively. (David Cabot [*in litt.*] on the night of 2nd April, 1964, made two counts and arrived at a figure of "550–600".)

On all nights except the first all the birds occupied the Plane tree nearest to the Nelson Pillar. On the earliest date, 4th February, 452 birds settled for the night in the nearest tree, 462 in the next and 4 in the third.

The method of counting the perched birds was to stand in one position between each tree in turn and to imagine all the branches of the tree to be in a single plane. Birds were then counted in each "area" between the more prominent branches; the maximum number of birds counted in any one "area" was 87. Two "areas" I counted thrice each, to gain an indication of accuracy, and the figures were: 57, 55 and 59; and 42, 40, 42. To each of the totals of birds as counted it seems reasonable to add 5 per cent to account for the birds hidden behind branches. Thus the corrected figures for the *settled* birds become *c.* 964 on 4th February, *c.* 938 on 13th March and *c.* 641 on 24th March.

Totals for the birds counted as they entered the roost were arrived at by noting each bird or party as it alighted in the tree, totting up and subtracting the number of birds noted leaving the tree (presumably temporarily) during the period of the assembly. Birds dispersing in the morning were counted as they took off from the tree. It is likely that some birds entering or leaving the tree on the side furthest from the observer were missed and this could explain why in the two cases where counts of settled birds can reasonably be compared with those of active birds, the "settled bird" totals are higher. We can gain some hint of the overall accuracy of the figures by making this comparison: *c.* 641 settled on 24th March is encouragingly close to the 565 entering an hour before, and the 572 dispersing in the morning.

I would estimate that the totals for assembled birds are accurate to plus or minus 10 per cent and those for the active birds rather less so. The point does emerge that the assembly behaviour of the species, if Dublin is not atypical, does allow—by comparison with species that arrive in large

flocks—for a reasonably accurate count to be made of birds as they assemble, which would normally be the only time when they would be visible: in Dublin, the ornithologist, with street lights to help him, is in the rare position of being able to count the birds once they've settled down! As Hutson (1956) says in a discussion of the study of bird roosting. "Few attempts have yet been made to continue observations after the birds have settled down for the night."

The figure of nearly a thousand birds in February, 1964, may be compared with earlier estimates at the same roost. There were over 100 birds in November, 1929 (Williams 1930 and Moffat 1931), but the roost was deserted early in December. The maximum in 1930/31 was "at the very least . . . over 500 birds" on 24th December (Moffat 1931); and in 1931/32 "there were certainly well over a thousand birds, probably not far from fifteen hundred"; this was from mid-October to about the end of December (Moffat 1932). At the end of 1933 there were "fully 2,000 birds" (Moffat 1934b), and a year later the same number was estimated (Moffat 1935). In 1948 Scroop estimated about a thousand birds in each of the three trees, and in November, 1950, John Barrington considered that 3,600 were present (Kennedy *et al.* 1954).

On 3rd September 1952 Stanley Cramp (*in litt.*) saw a roost in two trees on Burgh Quay at the corner of O'Connell Street several hundred yards from the site of the main roost. "Not counted, but certainly not more than a few hundred."

A roost of 3,600 Pied Wagtails is the second biggest on record, to the best of my knowledge (and I have searched the literature fairly thoroughly). The only other roosts of this species which exceed a thousand birds are as follows:

1. At least 2,000 in a reed bed on the Medway near Snodland (grid ref. 718607) in September 1963, and an estimated 5,000 there during the first half of September 1964. In 1965 the numbers built up from 200 in August to 2,000 in September, then moved to another site about one-third of a mile to the north and increased to 3,000 by the end of September. There were still 1,000 birds there on 1st December (Eric Philp *in litt.*).

2. The maximum estimated at a roost inside Power Station 'A' at Ferrybridge, near Castleford, Yorkshire, a site occupied for several years, was 2,500-plus (C. Winn, *in litt.*).

3. Greaves (1941), who studied the behaviour of the nominate race of this species in winter quarters in Egypt, states ". . . there was no doubt that on favourable occasions a single observer might see as many as 2,000."

4. Keywood (1937), describing a reed bed dormitory at the Black Pond, Esher, Surrey, says that there ". . . must have been several thousand."

5. A roost of 1,000-plus was seen at a Preston factory on 24th November 1962. Many of the birds came into a room, and settled to roost on steelwork and lagged steam pipes (N. Harwood *in* Spencer 1962).

6. Meinertzahgen (1940), referring to a roost he watched in Cornwall in April 1922 says, "Their numbers must have reached four figures."

It is possible that my early 1964 figures were low because the Pied Wagtail population was severely reduced by the hard winter of early 1963. J. Asbee, who has followed since 1958 the fortunes of a reed bed roost near

Rye in Sussex which normally holds up to 200 birds, found that in the autumn of 1963 it held only 50–60 birds (*Sussex Bird Report* 1964 and *in litt.*). A glasshouse roost in Somerset, normally occupied by anything up to 100+ birds from July to September, was hardly tenanted at all in 1963 (Sarah Padden, pers. comm.).

If the Dublin roost can hold up to 3,600 birds, it is interesting to speculate firstly on their origin—*i.e.* where they were hatched—and secondly on how far they range each day. Bannerman (1963) quotes Lack's suggestion that some British Pied Wagtails might migrate to Ireland. Kennedy *et al.* (1954) state that there is "ample testimony from light station on the south and east coasts that a considerable immigration takes place in autumn". But Peter Davis (*in litt.*, August 1965) tells me: "There is no evidence from ringing recoveries that any British birds move into or through Ireland . . . I can't think of evidence from any source that British Pied Wagtails move west across the Irish Sea; but this doesn't mean that it never happens. I think it very likely that the Dublin roost is composed entirely of Irish birds; the species would appear to be pretty common there and no very great area would need to be drawn upon to provide 3,600 birds."

THE DISPERSAL

On the morning of 25th March I counted the birds as they left the tree. The first individual flew to a nearby building at 05.34 and the last birds, a party of three, rose from the branches at 06.17, a period of 43 minutes. Once having left the tree, no birds were seen to return to it. The numbers departing in five-minute periods, and also the size of the parties, are shown in Table 4.

TABLE 4

To show numbers of parties by size and the total numbers of Pied Wagtails dispersing from roosting tree, Dublin, 25th March 1964

Party size: G.M.T. 5 mins. ending	1	2–10	11–20	21–30	31–40	*Total parties*	*Total birds*	*Average party size*
05.30	1					1	1	1.0
05.35	2					2	2	1.0
05.40	4	2				6	9	1.5
05.45	9	2				11	16	1.5
05.50	8	12	2	2	1	25	183	7.3
05.55	9	3	4	4	1	21	225	10.7
06.00	2	5	2	1		10	72	7.2
06.05	—	3	2			5	47	9.4
06.10	2	2				4	14	3.5
06.15	—	1				1	3	3.0
Totals	37	30	10	7	2	86	572	6.7
Individuals	37	122	152	186	75		572	

When I arrived at 05.25 the birds were as "settled" as when I had left them the previous evening. It was still fairly dark, though the sky was quite cloudless. The occasional bird moved from branch to branch and one party of five or six moved together a few feet. From 05.41 onwards, and

until the tree was empty, the birds started to move branch by branch upwards within the tree, preparatory to taking off from one of the outermost branches of the crown. The first twelve or so birds flew to the adjacent buildings. The first to rise high from the tree and set out purposively were five birds between 05.45 and 05.49. After this, the great majority flew directly away into the wind, though some birds continued to pause on the buildings and one small party that did so later took off to join a sizeable flock as it rose from the tree, and the whole group flew strongly away.

Comparing the assembly with the dispersal, we find that (*a*) the fly-out is accomplished in much less time, which is apparently true of other species (Hutson 1956), and that (*b*) the average party size of departing birds is twice as large.

VOCAL BEHAVIOUR

When approaching the roost, flying round, or actually entering, the birds utter the familiar "chisick" flight-call; these calls were heard particularly from the top of the Nelson Pillar but also from ground level in O'Connell Street.

The birds call as they gather in the tree, creating a distinctive evening chorus. My notes on this on the evening of 15th March, with times and approximate numbers of birds are as follows:

G.M.T.	*Degree of vocalisation*	*Approx. no. of birds in tree*
18.06	"Occasional calling"	14
18.13	"Calling a little"	14
18.25	"Fairly frequent calling"	173
18.27	"Frequent calls"	207
18.30	"Calling more obvious"	352
18.34	"Considerable continuous twitter"	534
18.36	"ditto"	638
18.45	"Still twittering"	800
18.47	"Twittering rather less"	803
18.50	"Still fairly continuous"	805
18.51	"Occasional calls"	805
18.52	"Quite quiet"	805

The calls uttered were of a softer, sweeter character than the usual flight call, but each was almost certainly a double note, as is the flight call. Individual calls were difficult to distinguish in the bird chorus and amid heavy Dublin traffic. However, on 16th March in Belfast, at another urban roost of this species, I was able to hear the birds at 15 feet range from a window at their level and was able to confirm the use of the softer double note; in addition, I heard occasional sung phrases, each of about eight or nine notes.

The precise function of this chorus is not clear. Armstrong (1963) says that the Dublin birds are "apparently attracting each other by their calls as well as their movements". Certainly the timing of the chorus is consistent with Armstrong's view in that the sound begins to subside once all the birds are in, but equally the cessation could be correlated with a particular light intensity. Wynne-Edwards in his highly stimulating book (1962), after quoting Moffat's (1931) description of the chorus, describes it as "a mass-demonstration, taking the form of a vocal chorus . . . presumed to have an epidieictic function". That is to say, the chorus provides an indication of the numbers of individuals present in a locality; if the numbers indicated

are too high in relation to predicted food supplies, then an exodus of the excess population follows. Certainly the sudden and puzzling changes in the numbers of wagtails at some roosts could be explained by Wynne-Edwards' theory, for example the 1957 observations of Rappe (1960), the January drop in Dublin numbers in 1932 (Moffat 1932) and the curious fluctuations in Richmond Park, London, in the late autumn of 1937 (Colyer 1938).

Colyer is one of the very few other writers who make reference to vocal behaviour at the roost. "From the moment of arrival of the first Wagtail at the pond there were continuous calls of "*chizick*" and other chirpings from the trees or grass-banks, perhaps most of all when the whole flock was assembled in the roost." Keywood (1937) says "The wagtails kept up their musical call continuously"; Coward (1928) says "When gathering at the roost a few male birds often join in a short evensong, simple but melodious, a twittering chorus not unlike that of a swallow." Sterland's charming account, written nearly a century ago, is well worth quoting in full: "They arrive in pairs about an hour before dusk and perch on the bushes, continuously shifting their places and uttering rather clamorously a shrill 't-wee'. Often I have stood concealed and watched their proceedings and as I listened to their busy twitter I could fancy that they were each of them detailing their personal adventures during the day. As darkness drew on the gossip gradually ceased and one by one they dropped down amongst the furze bushes" (Sterland 1869).

At a roost in a Somerset greenhouse that I visited on 24th July 1965 there was no chorus and very little calling, though I did hear a cock bird in very good song. The group vocalisation may only occur seasonally, in particular weather, or be influenced by some other variable.

Rappe's detailed account (1960) makes no mention of voice at all in roosting White Wagtails in Belgium, but the account by Greaves (1941) of a winter roost of this race in Egyptian fields of sugar-cane is worth quoting: "The birds circle round and up and down, constantly changing direction and calling. It was not clear whether those already down called, but it seemed obvious that the leaders of the flocks were trying to find out the places where others were already roosting and when the leaders went down the others followed at once or after making another short flight."

A number of other communal roosters indulge in an evening chorus, for example the House Sparrow (*Passer domesticus*) (Summers-Smith 1963).

When a flying predator appears, the chorus changes character (see under "Predators" below).

When I arrived at the Dublin roost site in near-darkness at 05.25 on the morning of 25th March to witness the morning departure, there were occasional calls from settled birds. As odd singles flew to nearby buildings and called, a bird in the tree would call, apparently in response. By 05.50, when small parties had begun to disperse, the calling in the tree intensified a little and in one 60-second period I counted 18 soft "tisups". Something like this rate of calling was kept up until the number left in the tree was considerably reduced. At no point did the volume and frequency of calling become continuous, or in any significant way approach the distinctive vocal display of the evening congregation. As each party took off from the

tree, however, its members called, creating a little clamour and usefully attracting the observer's attention.

PREDATORS

A. G. Mason told me that the Dublin roost had been known to attract a Sparrowhawk (*Accipiter nisus*), and John Smullen, an inspector with the Irish transport organisation, C.I.E., told me that in eighteen years he had frequently seen a hawk of this species, particularly in the winter months. The hawk would appear during the period of assembly, sometimes causing the wagtails to take to the nearest buildings, where a capture would sometimes be made. James Fisher told Smith (1950, p. 57) that in January 1947 a Sparrowhawk was preying on birds in the Dublin flock. I myself saw a male Sparrowhawk three times on the evening of 25th March, at 17.37, 17.53 and 18.02 G.M.T. The appearance of the enemy caused an intensification and harshening of the twittering chorus and once when the bird flew close to the tree it drove five Pied Wagtails out, but I did not see it capture a bird.

Mr. Smullen saw a "grey owl" in a roosting tree some ten or twelve years before, the only owl he had ever observed in the vicinity of the roost. As it perched in the tree the wagtails flew out. A photograph of the bird was taken by the Irish Press Ltd. and published in a Dublin newspaper. I have not seen this photograph, but apparently it was a Barn Owl (*Tyto alba*). Mr. Walter Mooney, who for sixteen years has been the attendant in the underground establishment near the southernmost tree, tells me he has seen at least four owls over the years, "brown" in colour—possibly Long-eared Owls (*Asio otis*), since the Tawny Owl (*Strix aluco*) is not found in the island.

URBAN ROOSTING

The selection of an urban habitat for sleeping by birds which spend the day outside that habitat is one interesting example of avian response to increasing urbanisation. It is perhaps best exemplified by the Starling (*Sturnus vulgaris*), whose town dormitories I have seen in London, Birmingham and Belfast, in Philadelphia, U.S.A., and which are also known from continental Europe, *e.g.* Amsterdam (Ko Zweeres, pers. comm.) and Rome (Gottard Reichelt, pers. comm.). Another species known similarly to behave is the Jackdaw (*Corvus monedula*). Steinfatt (quoted by Goethe 1934) saw a roost in Sofia which was brightly illuminated by the lights of the boulevards, and Nils Linnman (pers. comm., November 1965) told me that in Stockholm and other Swedish towns Jackdaw roosts in the trees of well-lit squares are regarded as unexceptional by Swedish ornithologists. K. E. L. Simmons (pers. comm.) saw a town roost in a single tree of Cattle Egrets (*Ardeola ibis*) in Cairo in 1950. An urban roost of Goldfinches (*Carduelis carduelis*) has recently been reported from London (Ruttledge 1965). In a review of a book Nicholson (1964) makes a tantalisingly brief reference to an observation he made in Colombia: the Common Nighthawk (*Chordeiles minor*) ". . . roosts in numbers in the town square at Villavicencio".

Other wagtail species which at least occasionally roost in towns are the Grey Wagtail (*Motacilla cinerea*) in the Hague (Koch 1934), and in Beirut (Cawkell 1947); and the Cape Wagtail (*Motacilla capensis*) in several towns in South Africa (Winterbottom 1964 and Skead 1954).

I am at present working on the urban roosts of *Motacilla alba* (Boswall, in preparation) and will therefore confine myself here to a list of the main towns known from the literature to have been occupied at least once by a congregation of either *M. a. yarrelli or M. a. alba*. They are as follows. In Britain: Bristol, Cambridge, Carlisle, Cheltenham, Edinburgh, Leicester, and London (several suburbs). In Germany: Frankfurt, Hanover and Osnabruck. In Italy: Milan, Perugia and Rome. In Egypt: Cairo. In Tunisia: Sbeitla.

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